GEO-ENVIRONMENTAL SITE INVESTIGATION REPORT

26 HIGH STREET
BURWELL
CAMBRIDGESHIRE
CB25 0HB

Reference Number 3309/Rpt 2v1
September 2023

Prepared for

Rowe Build
C/o Gary Johns Architects

By

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Client	Rowe Build C/o Gary Johns Architects
Report Title	Geo-environmental Site Investigation Report: 26 High Street, Burwell
Reference Number	3309/Rpt 2v1
Date	September 2023

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EXECUTIVE SUMMARY

This report describes the findings of a geo-environmental site investigation of 26 High Street, Burwell, Cambridgeshire. It is proposed to redevelop the site for residential usage.

The area was vacant and demolition works had been undertaken to ensure that the necessary on-site contamination investigation works could be conducted.

The conceptual model prepared for the site did identify potentially active pollution linkages between the historical land use of the site and the future use as residential.

The investigation consisted of the drilling of boreholes and the installation of gas monitoring wells. During the drilling, soil samples were obtained and submitted for chemical analysis. Gas monitoring was also undertaken.

The following conclusions were made:

The Tier I Human Health Risk Assessment has determined that there are no concentrations of potential contaminants within the underlying made ground and natural soils that are at levels that would pose an unacceptable level of risk to human health of future site occupants and site users.

The Tier I Controlled Water Risk Assessment has determined that there are no concentrations of potential contaminants within the underlying soils that would pose an unacceptable level of risk to controlled waters.

The monitoring and risk assessment for bio-genic ground gas concluded that ground gas would not pose an unacceptable level of risk to future site users and the development.

The risk assessment in respect to the future planting and towards sensitive ecological receptors identified that there are no concentrations of determinants at levels that would pose an unacceptable level of risk to future planting and sensitive ecological receptors.

The risk assessment in respect to water supply infrastructure identified that the determinants at the site would not pose an unacceptable level of risk to the integrity of PE or PVC pipework.

From the results of the site investigation, it is considered that no further site investigation is required and no remediation is required.

1 INTRODUCTION

Brown 2 Green Associates Ltd have been commissioned by Gary Johns Architects on behalf of Rowe Build to undertake a Geo-environmental Site Investigation of land at 26 High Street, Burwell, CB25 0HB. The site is located at National Grid Reference 559034, 266119. The site location is presented in Figure 1.

A Phase 1 desk study was previously completed by eps. The findings of the desk study are presented in the report titled:

> Phase 1 Geo-Environmental Desk Study Report: 26 High Street, Burwell, dated 18th July 2017; Ref UK 17.2720, issue 2.

The report recommended that a Phase 2 intrusive site investigation should be undertaken. This report presents the findings of the Phase 2 intrusive site investigation.

This report should be read in conjunction with the Phase 1 desk study.

1.1 Proposed Development

It is proposed to redevelop the site for residential usage consisting of two dwellings with associated gardens and parking. The proposed development is shown on drawing number 16-417 10 rev D prepared by Gary Johns Architects. The proposed development layout is presented in Appendix II.

1.2 Objectives

The objectives of the work are to provide an Environmental Risk Assessment to inform about potential re-development of the site, address the requirements of the National Planning Policy Framework[1] and Planning Practice Guidance. These objectives are achieved by:

> Investigation of any identified pollution linkages to determine any potential environmental risks, liabilities and development constraints associated with the site in relation to the future use of the site and in relation to off-site receptors; and,
>
> Provide a factual and interpretive report and recommendations on any potential development issues.

The investigation has been completed using the initial Conceptual Site Model (CSM) developed as part of the desk study. This CSM examines potential Source-Pathway-Receptor contaminant linkages in relation to identified or potential contamination issues at the site and vicinity, incorporating them into a Preliminary Risk Assessment. This report has been completed in accordance with Environment Agency Contaminated Land Risk Management.

The Preliminary Risk Assessment seeks to establish firstly whether unacceptable risk as defined in Part 2A of the Environmental Protection Act 1990 is present and secondly whether a possibility of harm to controlled waters, human health or property is present and further investigation is therefore needed to better inform about risk assessment.

Consideration of geotechnical/engineering aspects of the proposed development falls outside the scope of this assessment.

[1] National Planning Policy Framework, Department for Communities and Local Government, July 2021.

1.3 Sources of Information

Background information relating to the site was acquired and referenced from the following sources:

> Report prepared by eps: Phase 1 Geo-Environmental Desk Study Report: 26 High Street, Burwell, dated 18th July 2017; Ref UK 17.2720, issue 2.

2 SITE LOCATION AND SETTING

This section presents a summary of the site location and setting. A detailed description can be found in the previous report. Where changes have been identified, these have been noted.

2.1 Site Location

The site is located in a rural area on the eastern side of High Street. The site location is presented in Figure 1.

The site walkover completed by eps in June 2017 identified the presence of a butchers and associated buildings in the northern part of the site. The buildings were brick built and had a layout similar to a stable/abattoir. Anecdotal evidence from the former site owner indicated that the buildings were previously used as slaughterhouses and historically blood was drained into an underground septic tank which was removed in the mid 1950's. It was noted that the blood was collected for use as manure. The slaughtering of animals ceased around that time. A well that was present in the central part of the site was also infilled around the same period. Open sided barns were present in the south-eastern part of the site and were used for storage of farm equipment (e. g. tractors and trailers). These buildings were previously used as a cattle yard. It was noted that the roof of the buildings consisted of materials suspected to contain asbestos. The site was covered with hardstanding.

At the time of the site investigation completed by Brown 2 Green Associates Ltd in July 2023 the site was vacant, and all the buildings have been demolished. An old partly backfilled soakaway was present on the north-western part of the site.

The northern and western boundaries of the site were defined by temporary fencing. The western and southern boundaries were defined by the walls of the neighbouring buildings.

The topography of the site slopes towards the west.

The original site layout is presented in Figure 2.

2.2 Historic Land Use

The desk study identified that the site had been used as a butchers and for agricultural storage. There is also anecdotal evidence of slaughtering of animals and draining of blood took place on site. Historic lime works were noted adjacent to the eastern side of the site. A farm and a historic coal yard were located within 100m from the site. A dismantled railway was also present 180m to the south. The following historical sources of contamination were identified:

General quality of the made ground;
Historical use of site as butchers (including slaughtering of animals and draining of blood)
Landfilled areas located adjacent to east of the site.
Dismantled railway line located approximately 180m to the south.

2.3 Geology and Hydrogeology

The British Geological Survey website indicates that the site is underlain by the following geology:

Geological Unit	Drift/Solid	Description
None Present	Drift	
Zig Zag Chalk Formation	Solid	Mostly firm, pale grey to off-white blocky chalk with a lower part characterised by rhythmic alternations of marls and marly chalks with firm white chalk. Thin gritty, silty chalk beds act as markers in the sequence.

The data base on the presence of natural cavities held by Stantec records that no natural cavities have been recorded within 500m of the site.

The British Geological Survey database for Natural Hazards indicates that the potential for dissolution of soluble ricks is described as Negligible.

2.4 Hydrology

The nearest surface water feature is a pond located 130m to the west.

There are two licensed surface water abstraction points within 500m radius of the site. The nearest one is located 311m to the west where water is abstracted from a stream for spray irrigation.

The database indicates that the site does not lie in a fluvial or tidal floodplain.

2.5 Industrial Setting

The desk study did not identify any potentially contaminative industrial sites that would present a risk to the subject site.

3 INITIAL CONCEPTUAL MODEL

Brown 2 Green Associates Ltd has reviewed and updated the a conceptual model to identify potential sources, migration pathways and receptors within the study area. Assuming there is an active pollution pathway linkage between the source and receptor an assessment has been made of the level of risk. The level of risk is a consideration of both:

the likelihood of an event (probability) [takes into account both the presence of the hazard and receptor and the integrity of the pathway]; and
the severity of the potential consequence [takes into account both the potential severity of the hazard and the sensitivity of the receptor].

The classifications of the probability of an event occurring based on C552 CIRIA, 2001[2] are presented below:

Probability		Definition
High Likelihood	> 90% of hazard receptor linkage	There is a pollution linkage and an event that either appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor that there is harm or contamination
Likely	45-90% of hazard receptor linkage	There is a pollution linkage and all the elements are present and in the right place which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term
Low likelihood	10-50% of hazard receptor linkage	There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such event would take place, and is less likely in the shorter term.
Unlikely	10% of hazard receptor linkage	There is a pollution linkage but circumstances are such that it is improbable that an event would occur even in the very long term.

The classification of the severity of an event is presented below:

Severity	Category	Definition	Examples
Severe: It is likely that the hazard source could cause harm to a designated receptor and harm would be significant.	Humans	Short term (acute) risk to human health likely to result in "significant harm" as defined by the Environment Protection Act 1990, Part IIA.	High concentrations of cyanide on the surface of an informal recreation area.
	Controlled Water	Short term risk of pollution of sensitive water resource.	Major spillage of contaminants from site into controlled water.
	Property	Catastrophic damage to building or property	Explosion causing building to collapse.
	Ecological systems	A short term risk to a particular ecosystem, or organism forming part of such an ecosystem.	Loss of ecosystem.
Medium: It is possible that the hazard source could cause harm to a designated receptor, but it is unlikely that the harm would be significant	Humans	Chronic damage to human health ("significant harm" as defined in the DETR, 2000).	Concentrations of a contaminant from site exceeds the generic, or site specific assessment criteria
	Controlled Water	Pollution of sensitive water resources.	Leaching of contaminants from a site to a Principal Aquifer.
	Ecological systems	A significant change in a particular ecosystem, or organism forming part of such an ecosystem.	Death of a species within a designated nature reserve.

[2] Contaminated land risk assessment. A guide to good practice (C552), D J Rudland, R M Lancefield and P N Mayell.

Severity	Category	Definition	Examples
Mild: It is possible that the hazard source could cause significant harm to a designated receptor, however it is likely to be mild	Controlled Waters	Pollution of non-sensitive water resource.	Pollution of non-classified groundwater
	Property	Significant damage to buildings/structures and crops ("significant harm" as defined in the DETR, 2000). Damage to sensitive buildings/structures or the environment.	Damage to building rendering it unsafe to occupy (e.g. foundation damage resulting in instability).
Minor: The potential hazard source cannot cause significant harm to the receptor.	Financial or project	Harm, although not necessarily significant harm, which may result in a financial loss, or an expenditure to resolve.	
	Humans	Non-permanent health effects to human health (easily prevented by means such as Personal Protective Clothing, etc).	The presence of contaminants at such concentrations that protective equipment is required during site works.
	Property	Easily repairable effects of damage to buildings/structures	The loss of plants in landscaping scheme. Discolouration of concrete.

The comparison of Likelihood against Severity is presented below:

		Severity			
		Severe	**Medium**	**Mild**	**Minor**
Likelihood	**High Likelihood**	**Very High Risk**	**High Risk**	**Moderate Risk**	**Moderate / Low Risk**
	Likely	**High Risk**	**Moderate Risk**	**Moderate / Low Risk**	**Low Risk**
	Low Likelihood	**Moderate Risk**	**Moderate / Low Risk**	**Low Risk**	**Very Low Risk**
	Unlikely	**Moderate / Low Risk**	**Low Risk**	**Very Low Risk**	**Very Low Risk**

The potential consequence of risk classifications is presented below:

Very High Risks	There is a high probability that severe harm could arise to a designated receptor from an identified hazard, OR, there is evidence that severe harm to a designated receptor is currently happening. This risk, if realised, is likely to result in a substantial liability. Urgent investigation (if not undertaken already) and remediation are likely to be required.
High Risks	Harm is likely to arise to a designated receptor from an identified hazard. Realisation of the risk is likely to present a substantial liability. Urgent investigation (if not undertaken already) is required and remedial works may be necessary in the short term and are likely over the longer term.
Moderate Risks	It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild. Investigation (if not already undertaken) is normally required to clarify the risk and to determine the potential liability. Some remedial works may be required in the longer term.
Moderate / Low Risks	It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be medium to mild and professional judgement is required. Some remediation works may be required in the long term where high sensitivity receptors are involved.
Low Risks	It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild.
Very Low Risks	There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is not likely to be severe.

3.1 Potential Sources of Contamination

On-site Potential Sources

Based on the findings of the site walk-over and the desk study information review the following potential on-site sources of contaminants that may plausibly impact the site were identified:

General quality of the made ground;
Historical use of site as butchers (including slaughtering of animals and draining of blood).

Off-site Potential Sources

Based on the findings of the site walk-over and the desk study information review the following potential off-site sources of contaminants that may plausibly impact the site were identified:

Landfilled areas located adjacent to east of the site.
Dismantled railway line located approximately 180m to the south.

3.2 Potential Pathways

Plausible pathways identified for each contaminant are presented in the initial conceptual model detailed overleaf.

3.3 Potential Receptors

Brown 2 Green Associates Ltd has identified the following possible receptors:

Human health - future users of the site (residential with private gardens).
Human health - construction workers
Controlled water (groundwater and surface water).
Buildings and construction materials (concrete).
Water supply pipework.

3.4 Discussion of Potential Pollutant Linkages

Potential pollution linkages identified are presented in the initial conceptual model detailed overleaf.

Initial Conceptual Model and Risk Assessment

Potential Contaminant	***Potential migration pathway***	***Potential Receptors***	***Probability of Risk***	***Severity***	***Risk Classification***	***Comments*** ***Active/Inactive***
On-site Sources						
Made ground						
Metals (As, Cd, Cr, Pb, Hg, Se, Ni, V)	Ingestion of contaminated soil and dust by direct contact and soil attached to home grown vegetables. Inhalation of dust (indoor and outdoor).	Future site users	High likelihood	Medium	High	Potentially active in areas of soft landscaping and private gardens. Further assessment required.
	Ingestion of contaminated soils by direct. Inhalation of dust (indoor and outdoor).	Construction workers	Likely	Minor	Low	Potentially active but short-term exposure. General site practices and site PPE (gloves) will reduce exposure.
Metals (Cu, Ni, Zn)	Uptake by plants	Planting and soft landscape areas	Likely	Minor	Low	Potentially active in areas to be developed as soft landscaping and gardens. Further assessment required.
PAHs in ash and coal tar	Ingestion of contaminated soil and dust by direct contact and soil attached to home grown vegetables. Inhalation of dust (indoor and outdoor).	Future site users	Likely	Medium	Moderate	Potentially active in areas of soft landscaping and private gardens. Further assessment required.
	Ingestion of contaminated soil and dust by direct contact. Inhalation of dust (indoor and outdoor).	Construction workers	Likely	Minor	Low	Potentially active but short-term exposure. General site practices and site PPE (gloves) will reduce exposure.
	Downward and lateral migration.	Groundwater Surface Water	Low likelihood	Medium	Moderate/Low	Potentially active.
	Contact with contaminated soils.	Water supply infrastructure	Likely	Medium	Moderate	Potentially active.

Potential Contaminant	***Potential migration pathway***	***Potential Receptors***	***Probability of Risk***	***Severity***	***Risk Classification***	***Comments*** ***Active/Inactive***
Asbestos	Inhalation of fibres.	Future site users and construction workers	Likely	Severe	Moderate	Potentially active.
Ground gas	Through soil.	Future users and buildings	Unlikely	Medium	Low	Potentially active should made ground be identified at thickness greater than 2m and with high organic matter content to act as source.
Historical use of site as butchers (including slaughtering of animals and draining of blood)						
Total Petroleum Hydrocarbons, from fuels and phenols from detergents	Migration through soil and in groundwater	Future site users and construction workers	Likely	Medium	Moderate	Potentially active.
Ground gas from degradation of organic matter resulting from slaughter of animals, including presence of blood tanks.	Migration through soil.	Future users and buildings	Likely	Medium	Moderate	Potentially active.
Off-site Sources						
Landfilled areas located adjacent to the east of the site						
Soil Gases	Movement through soil	Future site users	Unlikely	Severe	Low	The area formerly occupied by the lime works has been redeveloped as residential in the early 1990's. Therefore, it is considered that the risk is low.
Dismantled railway line located approximately 180m to the south						

Potential Contaminant	***Potential migration pathway***	***Potential Receptors***	***Probability of Risk***	***Severity***	***Risk Classification***	***Comments*** ***Active/Inactive***
Total Petroleum Hydrocarbons and PAHs	Migration through soil and in groundwater	Future site users and construction workers	Unlikely	Medium	Low	**Pollution linkage is inactive.** The site is located upgradient from the source.

4 SITE INVESTIGATION

4.1 Exploratory Fieldwork

Five boreholes (WS1 to WS5) were drilled using a window sample drilling rig on 13th June 2023 to a maximum depth of 5.45m below surface. Drilling of some of the boreholes was suspended as no further advance could be achieved.

The sample locations were based on the site conceptual model to provide a general assessment of the quality beneath the soils beneath site. The sampling locations are illustrated in Figure 3.

Soil samples destined for chemical testing were collected in laboratory prepared jars. Samples for organic analysis were placed in amber glass jars, samples for volatile analysis in vials with septums and samples for inorganic analysis in plastic tubs. During the site works recovered soils were geologically logged by an experienced Geo-environmental Engineer. The geological logs are presented in Appendix III.

On completion of the drilling, two boreholes were converted to monitoring wells using 63 mm HDPE solid and slotted casing and well screening. Each well was sealed and equipped with a gas valve. The installation details are presented with the geological logs in Appendix III.

To assess soil gas levels (methane, carbon dioxide and oxygen) each monitoring well was sealed and equipped with the gas valve. Six gas monitoring visits were completed using a calibrated Gas Data GFM435 landfill gas analyser. Atmospheric pressure and temperature, differential pressure and flow rates were also recorded. The wells were also screened for hydrocarbon vapours using a PID.

4.2 Chemical Analysis

The soil samples were submitted to Eurofins/Chemtest Ltd of Newmarket, Suffolk. The chemical analysis was carried out under UKAS/MCERTS accreditation protocols. The chemical analysis was carried out in accordance with the findings of the Phase I Desk Study (eps report UK 17.2720) and the observations made during the site works. The chemical testing programme included.

Metals Suite (As, Cd, Cr, hex Cr, Cu, Pb, Hg, Ni, Se, Zn, V);
Speciated PAH (USEPA 16);
TPH – CWG;
VOC;
Total Cyanide;
pH;
Organic Matter;
Soluble Sulphate; and
Asbestos fibres.

5 RESULTS

5.1 Summary of Site Investigation Observations

Ground Conditions

The geological logs are presented in Appendix III.

Made Ground

The boreholes indicate that the site is generally underlain by 0.3m of made ground consisting of dark grey slightly gravelly, slightly sandy, silty clay with rare anthropogenic materials. In the north-western corner of the site, in WS4, up to 2.0m of made ground was noted. It is believed that a basement was previously located in the area. A backfilled soakaway was also present within this part of the site.

Zig Zag Chalk Formation

The made ground is underlain by weak light cream structureless marly Chalk (Dc) composed of silty gravel.

Visual and Olfactory Evidence of Contamination

No visual or olfactory evidence of contamination was noted.

Groundwater Conditions

During the investigation no groundwater strikes or seepages were recorded. All boreholes were dry on completion of drilling.

It should be noted that groundwater levels can fluctuate seasonally and therefore, may be encountered at higher or lower elevations than those recorded in this site investigation.

5.2 Laboratory Results

The chemical analysis of the soil samples was undertaken by Eurofins/Chemtest Ltd of Newmarket under MCERT and UKAS accreditation. The test certificates are included in Appendix IV.

5.3 Gas Monitoring

Six ground gas monitoring visits have been completed. The results of the ground gas monitoring are presented in Appendix V and summarised below.

	Methane Range %v/v	Carbon Dioxide Range % v/v	Oxygen Range % v/v	Flow (l/hr)
WS3	0.0	0.7-1.3	20.2-20.7	<0.1
WS5	0.0	2.1-2.6	18.4-19.2	<0.1

6 RISK ASSESSMENT

6.1 Human Health

6.1.1 Approach

Brown 2 Green Associates Ltd has undertaken a Tier 1 Human Health Risk Assessment to determine if any potential contaminants within the underlying soil pose an unacceptable level of risk to the identified human health receptors.

At a Tier 1 stage the long term (chronic) human health toxicity of the soil has been assessed with reference to Generic Assessment Criteria (GAC) detailed in Nathanail, C. P., McCaffrey, C., Gillett, A. G., Ogden, R. C. and Nathanail, J. F. 2015. The LQM/CIEH S4ULs for Human Health Risk Assessment. Land Quality Press, Nottingham (Copyright Land Quality Management Limited reproduced with permission; Publication Number S4UL3086). If no generic GAC (CIEH/LQM) is available, reference has been made to Category 4 Screening Values or GAC have been determined by Brown 2 Green Associates Ltd using CLEA 1.06 with adjustments based on input data used in the calculation of Category 4 Screening Values.

Where appropriate, as detailed in the Professional Guidance: Comparing Soil Contamination Data with a Critical Concentration (CL:AIRE, 2020), a comparison of the 2-way confidence interval with the relevant GAC threshold is applied to determine whether the degree of contamination detected is statistically significant.

For the assessment of risk to human health from groundwater a qualitative risk assessment has been undertaken. Within this section we have only considered the risk to users of the site. An assessment of risk to human health beyond the boundaries of the site is considered as part of the risk to controlled waters.

6.1.2 Risk from Soil

Risk to Future Site Users

For the purposes of the Tier 1 assessment Brown 2 Green Associates Ltd have initially compared the laboratory test data directly to the relevant Brown 2 Green Associates Ltd Tier 1 human health screening criteria for residential with plant uptake end use with a soil organic matter content of 6.0%. The results of this direct comparison are presented below:

Determinant	Units	GAC	n	MC	Locations above GAC	Path-way	Assessment
Arsenic	mg/kg	37	6	7.5	-	1	No Further Action
Cadmium	mg/kg	11	6	0.8	-	5	No Further Action
Chromium (III)	mg/kg	910	6	11	-	4	No Further Action
Chromium (VI)	mg/kg	6.0	6	<0.5	-	4	No Further Action
Copper	mg/kg	2400	6	37	-	5	No Further Action
Mercury (Inorganic)	mg/kg	40	6	0.21	-	1	No Further Action
Nickel	mg/kg	130	6	15	-	1	No Further Action
Lead *	mg/kg	200	6	170	-	1,4	No Further Action
Selenium	mg/kg	250	6	0.82	-	1	No Further Action
Vanadium	mg/kg	410	6	18	-	5	No Further Action
Zinc	mg/kg	3700	6	270	-	5	No Further Action
Cyanide (total)***	mg/kg	791	4	<0.5	-	1	No Further Action

Determinant	Units	GAC	n	MC	Locations above GAC	Path-way	Assessment
Naphthalene	mg/kg	13	6	1.1	-	5, 2	No Further Action
Acenaphthylene	mg/kg	920	6	0.41	-	5	No Further Action
Acenaphthene	mg/kg	1100	6	0.49	-	5	No Further Action
Fluorene	mg/kg	860	6	0.33	-	1, 5	No Further Action
Phenanthrene	mg/kg	440	6	2.0	-	5	No Further Action
Anthracene	mg/kg	11000	6	0.51	-	5	No Further Action
Fluoranthene	mg/kg	890	6	4.6	-	5	No Further Action
Pyrene	mg/kg	2000	6	3.9	-	1, 5	No Further Action
Benzo(a)anthracene	mg/kg	13	6	2.0	-	1	No Further Action
Chrysene	mg/kg	27	6	2.2	-	1	No Further Action
Benzo(b)fluoranthene	mg/kg	3.7	6	3.6	-	1	No Further Action
Benzo(k)fluoranthene	mg/kg	100	6	1.5	-	1	No Further Action
Benzo(a)Pyrene	mg/kg	3.0	6	2.8	-	1	No Further Action
Indeno(123-cd)pyrene	mg/kg	41	6	2.1	-	1	No Further Action
Dibenz(ah)anthracene	mg/kg	0.3	6	0.56	**WS4** (0.8-1.0m)	1	Further assessment (see below)
Benzo(ghi)perylene	mg/kg	350	6	2.0	-	1	No Further Action
TPH C_5-C_6 (aliphatic)	mg/kg	160	4	<0.05	-	2	No Further Action
TPH C_6-C_8 (aliphatic)	mg/kg	530	4	<0.05	-	2	No Further Action
TPH C_8-C_{10} (aliphatic)	mg/kg	150	4	<0.05	-	2	No Further Action
TPH C_{10}-C_{12} (aliphatic)	mg/kg	760	4	7.2	-	2	No Further Action
TPH C_{12}-C_{16} (aliphatic)	mg/kg	4300	4	4.4	-	1	No Further Action
TPH C_{16}-C_{35} (aliphatic)	mg/kg	110000	4	20	-	1	No Further Action
TPH C_{35}-C_{44} (aliphatic)	mg/kg	110000	4	<10	-	1	No Further Action
TPH C_5-C_7 (aromatic)	mg/kg	300	4	<0.05	-	2	No Further Action
TPH C_7-C_8 (aromatic)	mg/kg	660	4	<0.05	-	2	No Further Action
TPH C_8-C_{10} (aromatic)	mg/kg	190	4	<0.05	-	2	No Further Action
TPH C_{10}-C_{12} (aromatic)	mg/kg	380	4	<1.0	-	2	No Further Action
TPH C_{12}-C_{16} (aromatic)	mg/kg	660	4	<1.0	-	1	No Further Action
TPH C_{16}-C_{21} (aromatic)	mg/kg	930	4	13	-	1	No Further Action
TPH C_{21}-C_{35} (aromatic)	mg/kg	1700	4	40	-	1	No Further Action
TPH C_{35}-C_{44} (aromatic)	mg/kg	1700	4	7.7	-	1	No Further Action
Benzene	mg/kg	0.37	4	<0.001	-	2	No Further Action
Ethylbenzene	mg/kg	260	4	0.0018	-	2	No Further Action
Toluene	mg/kg	660	4	<0.001	-	2	No Further Action
m-xylene	mg/kg	320	4	0.004	-	2	No Further Action
p-xylene	mg/kg	310	4	0.004	-	2	No Further Action
o-Xylene	mg/kg	330	4	0.0032	-	2	No Further Action
MTBE **	mg/kg	49	4	<0.001	-	2	No Further Action

Notes
Main Exposure Pathways: 1 = Soil and dust Ingestion, 2 = Vapour Inhalation (indoor), 3 = Dermal Contact, 4 = Dust Inhalation, 5 = consumption of home grown produce.

Abbreviations: GAC = General Assessment Criteria, n = number of samples.

Tier 1 GAC are based on Nathanail, C. P., McCaffrey, C., Gillett, A. G., Ogden, R. C. and Nathanail, J. F. 2015. The LQM/CIEH S4ULs for Human Health Risk Assessment. Land Quality Press, Nottingham. **Copyright Land Quality Management Limited reproduced with permission; Publication Number S4UL3086.**
* - Category 4 Screening Level.
** - EIC/AGS/CL:AIRE Soil Generic Assessment Criteria for Human Health Risk Assessment January 2010.
*** - Brown 2 Green HH-GSV using CLEA V 1.06 and tox data from DEFRA/Environment Agency SGV.

All the results for VOCs are below their respective GAC.

A single sample obtained from WS4 between 0.8m and 1.0m recorded slightly elevated concentrations of dibenz(a,h)anthracene. The made ground identified in WS4 is limited to a small area in the north-western corner of the site. As the area where WS4 will be covered by the footprint of a proposed buildings. This provides a barrier that breaks the pollution linkage and therefore in these areas it is considered that the elevated PAH concentrations will not pose an unacceptable level of risk to human health.

Risk to Construction Workers

In respect to the risk to construction workers, this report and the generic assessment criteria (GAC) consider long term and chronic risk to humans based on defined exposure scenarios set out in the CLEA model. In some cases contaminants may also pose acute hazards to workers at a site, or a worker's exposure scenario may differ from the scenarios considered when deriving the GAC. As exposure times for construction workers are generally short term, risks from site contamination are generally addressed through the use of appropriate working procedures and the use of personal protective equipment (PPE) in line with the Management of Health and Safety at Work Regulations (1999), Construction (Design) Management Regulations (2007) for some sites and the Control of Substances Hazardous to Health Regulations (2002).

6.1.3 Risk from Asbestos in Soils

Loose fibres and clumps of chrysotile were identified in concentrations of 0.004% in the soil sample from WS4 (0.8-1.0m). From the results of the investigation, it is considered that the made ground that contains loose fibres of chrysotile is restricted to limited localised areas in the north-western part of the site.

For the assessment of risk from the asbestos to future site users reference has been made to The Decision Support Tool for the Qualitative Risk Ranking of Work Activities and Receptors Involved in or Exposed to Asbestos in Soil and Construction & Demolition Materials (CL:AIRE Version 2.1, March 2017). The tool indicates the following:

Hazard ranking: Low (10);
Exposure ranking: Very Low (2);
Receptor ranking: Low (4);
Combined hazard, exposure and receptor ranking: Low;
Pathway ranking: Very Low (4B);
Overall ranking: Negligible.

A copy of the assessment is presented in Appendix VI.

From the results of the site investigation and assessment of risk using the CL:AIRE Model Qualitative Risk Ranking, it is considered that the risk to future site users from the asbestos present within the made ground is negligible. Within the proposed development, the made ground identified in WS4 that contains asbestos will be located beneath the footprint of the building. The pollution linkages will be broken where hardstanding will be instated.

In respect to the risk to construction workers excavation activities will need to be undertaken. The results from the CL:AIRE Decision Support Tool for the Categorisation of Work Activities Involving Asbestos in Soil and Construction and Demolition Materials in accordance with the Control of Asbestos Regulations 2012 (Version 2.1, March 2017) (Joint Industry Working Group (JIWG)) are as follows:

Hazard ranking: Medium (11);
Exposure ranking: Low (9);
Combined hazard and exposure ranking: Low (20).

A copy of the assessment is presented in Appendix VI.

During the construction activities, the made ground that contains asbestos will be disturbed. Loose fibres have been identified and thus the potential for the release of fibres into the air is considered to be low. The assessment completed by Brown 2 Green Associates is based on typical construction site activities such as the excavation of the soil and the movement of plant and machinery. It does not consider the screening and crushing activities. Therefore, during the construction phase, as required by the Management of Health and Safety at Work Regulations (1999), Construction (Design) Management Regulations (2007) and the Control of Asbestos at Works Regulations (2012) risk assessments should be completed to determine the level of risk from all project specific construction activities.

6.1.4 Risk from Groundwater

As no pollution linkages have been identified, it is considered contamination in the groundwater beneath the site will not pose an unacceptable level of risk to human health.

6.2 Ground Gas

The potential impact on the development (human health and buildings) from biogenic ground gases has been assessed with reference to standards and guidelines published in CIRIA Report 665 (Assessing risks posed by hazardous ground gases to buildings, 2007).

During the six visits that were completed, the concentrations of methane were below the limit of detection. Slightly elevated levels of carbon dioxide (up to 2.6% v/v) were recorded in WS5, though both gases were also associated with low flow rates of less than 0.1litres/hr. The carbon dioxide levels that have been detected are typical for chalk and are the result of natural weathering processes.

In accordance with the methodology outlined within the CIRIA publication C665, Brown 2 Green Associates Ltd have utilised the results of the ground gas monitoring surveys to calculate a Gas Screening Value (GSV) for the proposed development. The GSV has been compared to the criteria outlined within CIRIA C665 to determine the level of risk to the proposed development and to ensure the appropriate remedial options are incorporated into the building design.

Based on the classification scheme proposed by CIRIA Report 665, the Gas Screening Values (GSV) for methane and carbon dioxide detected across the site would be classified as Characterisation Situation 1, which for any new developments current guidance suggests that no special gas protection precautions are required.

6.3 Risk to Controlled Water

To assess risk to controlled waters from the leaching of determinants from soil, a Qualitative Risk Assessment has been made based on the concentrations identified within the soil samples and site conditions. From the results it is considered that concentrations will not be mobilised at concentrations that would pose an unacceptable level of risk to controlled waters.

6.4 Risk to Planting

An assessment of risk to from potentially phytotoxic metal compounds has been completed. In the absence of published assessment criteria specifically for contaminated land, GAC have been obtained from legislation (UK and European) and guidance related to the use of sewage sludge on agricultural fields.

For the assessment values defined in The Sludge (use in Agriculture) Regulations 1989 (Public Health England, Wales and Scotland), as amended in 1990 and The Sludge (use in Agriculture) Regulations (Northern Ireland) SR No, 245, 1990 have been adopted. In addition the Department of Environment (DoE) produced a Code of Practice (CoP) (Updated 2nd Edition) in 2006 which provided guidance on the application of sewage sludge on agricultural land. The specified limits of concentrations of selected elements in soil are presented in the 2nd Edition of the DoE Code of Practice and are designed to protect plant growth.

As all concentrations are below their respective assessment criteria, it is considered that the concentrations of phytotoxic metals are not at levels that would pose an unacceptable level of risk to planting.

6.5 Risk to Water Supply Pipe

The assessment of risk to pipe work used in the potable water supply has been made using UK Water Industry Research (UKWIR) "Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites" (Ref 10/WM/03/21)" January 2011 and supplement "Contaminated Land Assessment Guidance" dated January 2014. The results from samples of made ground (through which any new water supply pipes are likely to pass) have been compared with the threshold values listed in the UKWIR guidance. It should be noted that the threshold values are for use by designers in the selection of appropriate pipe materials. Exceedance of a threshold value indicates only that there could be a 'water quality issue'. Threshold values are generally protective of taste and odour quality of water in plastic water pipes and only threshold values for benzene and MTBE are protective of human health.

Beneath the site the results indicate that concentrations are at levels that enable PE/PVC pipe work to be adopted. It is recommended that the relevant water supply company be contacted at an early stage to confirm its requirements for assessment, which may not necessarily be the same as those recommended by UKWIR.

6.6 Risk to Sensitive Ecological Receptors

As no receptors were identified, it is considered that contamination will not pose an unacceptable risk to ecological receptors.

6.7 Risk to Historical Structures and Monuments

As no receptors were identified, it is considered that contamination will not pose an unacceptable risk to historical structures and monuments or sites of historical interest.

7 REVISED CONCEPTUAL MODEL

Following the completion of the intrusive site investigation and contaminated land risk assessment, Brown 2 Green Associates Ltd has not identified any active pollutant linkages based on the proposed redevelopment of the site.

8 GEO-ENVIRONMENTAL CONCLUSIONS AND RECOMMENDATIONS

8.1 Conclusions

The Tier I Human Health Risk Assessment has determined that there are no concentrations of potential contaminants within the underlying made ground and natural soils that would pose an unacceptable risk to human health of future site occupants and users.

The Tier I Controlled Water Risk Assessment has determined that there are no concentrations of potential contaminants within the underlying soils that would pose an unacceptable risk to controlled waters.

The monitoring and risk assessment for bio-genic ground gas concluded that there are no concentrations at levels that would pose an unacceptable risk to human health and the proposed development.

The risk assessment in respect to the future planting and towards sensitive ecological receptors identified that the determinants at the site are at levels that would not pose an unacceptable level of risk to future planting and sensitive ecological receptors.

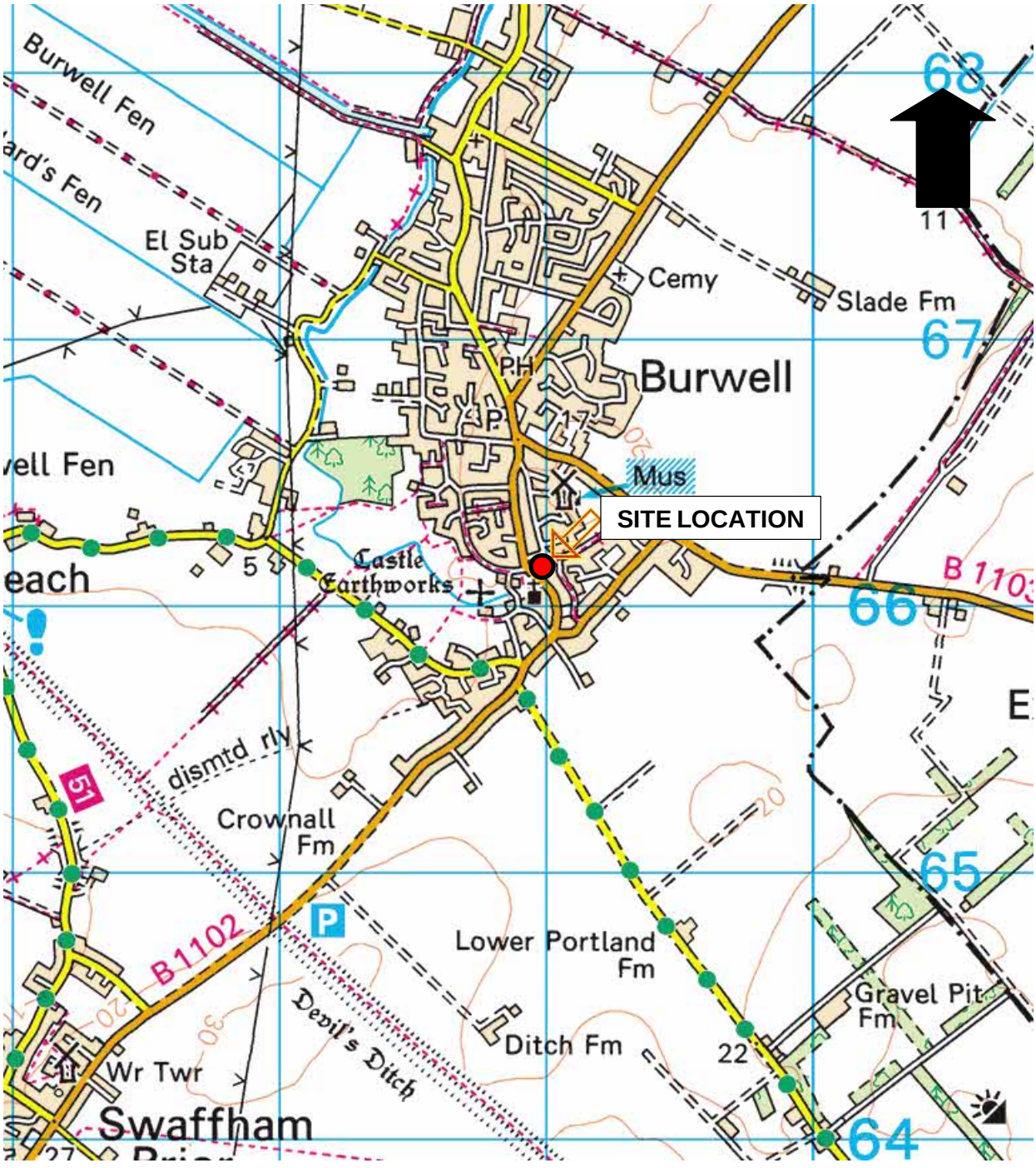
The risk assessment in respect to water supply infrastructure identified that the determinants at the site would not pose an unacceptable level of risk to the integrity of PE or PVC pipework.

8.2 Recommendations

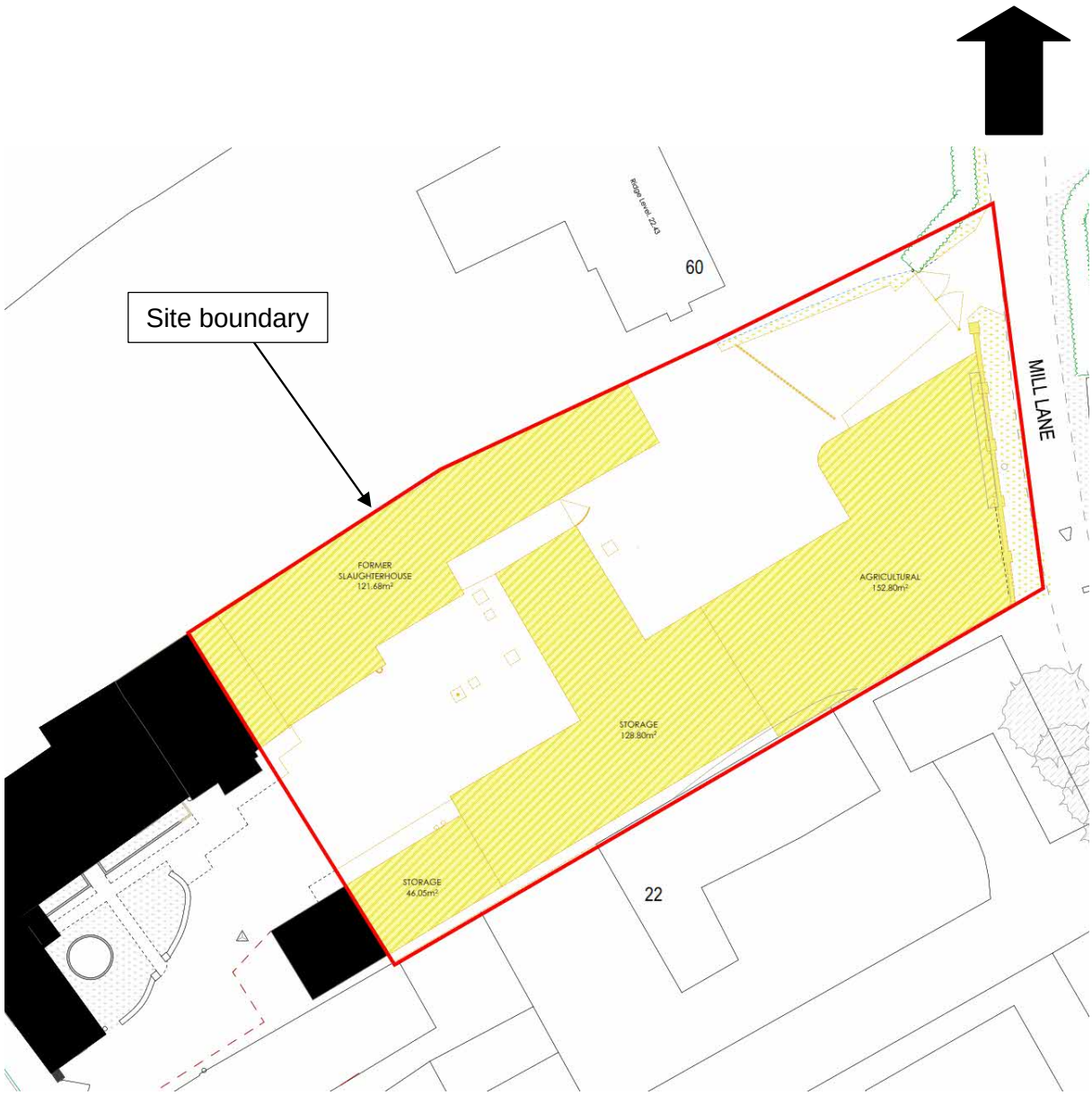
From the results of the site investigation, it is considered that no further site investigation is required and no remediation is required.

If any suspected contamination, underground storage tanks or chambers not previously identified is revealed during construction contact should be made with an Environmental Consultant to determine suitable action to be undertaken.

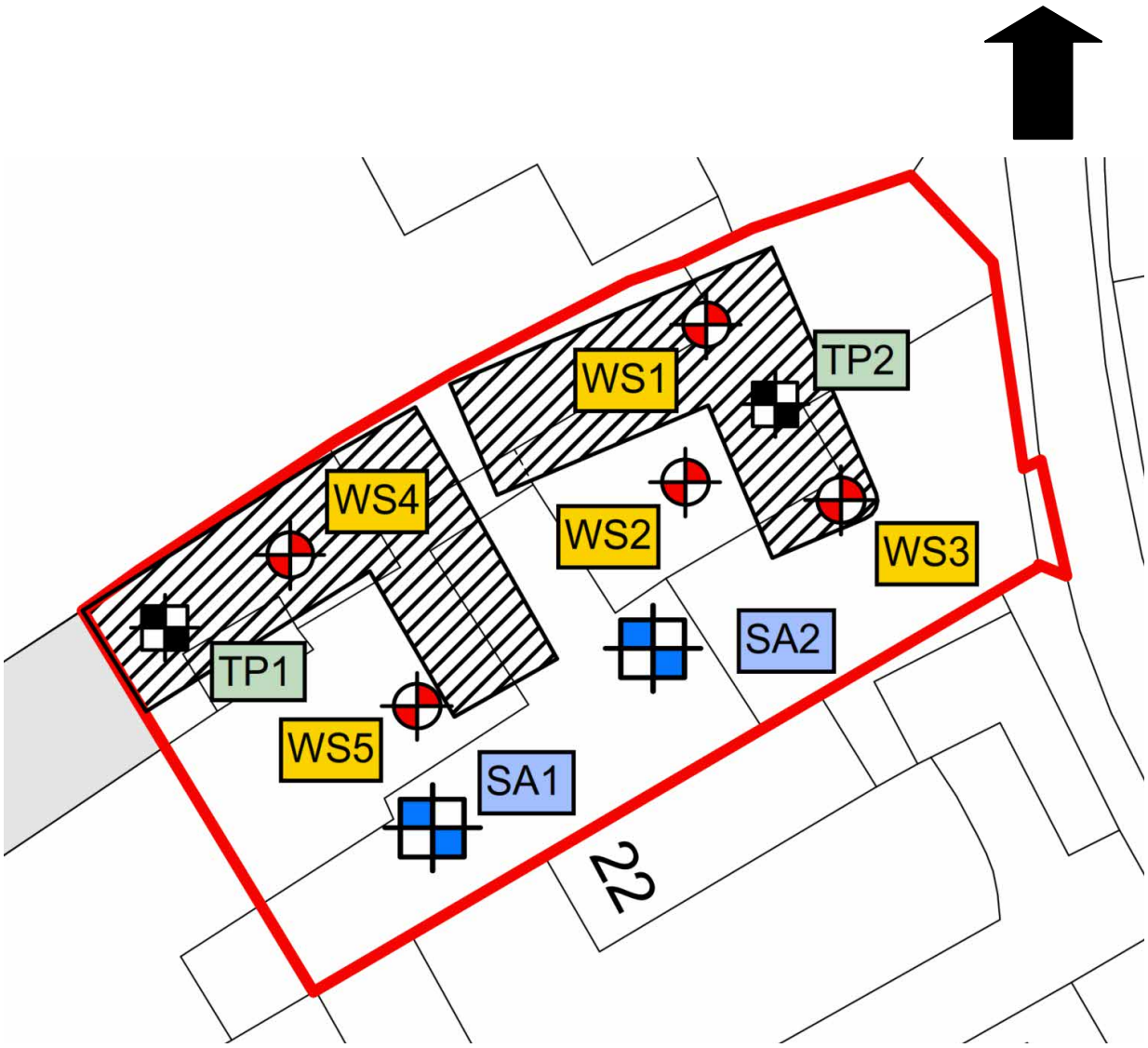
FIGURES



Project Number: 3309	Project: 26 High Street, Burwell	Scale: NTS
Figure 1	**Site Location Plan**	Brown 2 Green



Project Number: 3309	Project: 26 High Street, Burwell	Scale: NTS
Figure 2	**Original Site Layout**	Brown 2 Green



Project Number: 3309	Project: 26 High Street, Burwell	Scale: NTS
Figure 3	**Exploratory Hole Location Plan**	Brown 2 Green

APPENDIX I

LIMITATIONS AND CONSTRAINTS

Brown 2 Green Associates Limited has prepared this report in accordance with our standard Terms and Conditions solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed and outlined in the body of the report.

Brown 2 Green Associates Ltd cannot be held responsible for any use of the report or its contents for any purpose other than that for which it was prepared. The client cannot place reliance on the report until full payment has been made. The copyright in this report and other plans and documents prepared by Brown 2 Green Associates Ltd is owned by them and no such plans or documents may be reproduced, published or adapted without written consent. Complete copies of the report may, however, be made and distributed by the client as is expected in dealing with matters related to its commission. Should the client pass copies of the report to other parties for information, the whole report should be copied, but no professional liability or warranties shall be extended to other parties by Brown 2 Green Associates Ltd in this connection without their explicit written agreement thereto by Brown 2 Green Associates Ltd.

For the work, reliance has been placed on publicly available data obtained from the sources identified and data supplied by other parties. The information is not necessarily exhaustive and further information relevant to the site may be available from other sources. When using the information it has been assumed it is correct. No attempt has been made to verify the information. Brown 2 Green Associates Ltd does not warrant work / data undertaken / provided by others.

Due to the short timescales associated with these projects responses may not have been received from all parties. Brown 2 Green Associates Limited cannot be held responsible for any disclosures that are provided post production of our report and will not automatically update our report.

This report has been produced in accordance with UK policy and legislative requirements for land and groundwater contamination at the time the report was commissioned. Should changes in legislation or policy occur the report findings may need revisiting once the development layout is confirmed.

During the site walkover reasonable effort has been made to obtain an overview of the site conditions. However, during the site walk-over no attempt has been made to enter areas of the site that are unsafe or present a risk to health and safety, are locked, barricaded, overgrown or the location of the area has not been made known, or where access has not been permitted.

Access considerations, the presence of services and the activities being carried out on the site limited the positions where sampling locations could be installed and the techniques that could be used.

This report presents an interpretation of the geo-environmental information established by excavation, observation and testing. It should be noted that when investigating, or developing land it is important to recognise that sub-surface conditions may vary spatially and also with time. Groundwater conditions are dependent on seasonal and other factors. Consequently there may be conditions present not revealed by this investigation. The absence of certain ground, ground gas, and contamination or groundwater conditions at the positions tested is not a guarantee that such conditions do not exist anywhere across the site. Due to the presence of existing buildings and structures access could not be obtained to all areas. Additional contamination may be identified following the removal of the buildings or hard standing.

The scope of any investigation was basis of the specific development and land use scenario proposed by the Client and may be inappropriate to another form of development or scheme. If the development layout was not known at the time of the investigation the report findings may need revisiting once the development layout is confirmed.

Rather, this investigation has been undertaken to provide a characterisation of the existing sub-surface geo-environmental characteristics and make up and the findings of this study are our best interpretation of the data collected, within the scope of work and agreed budget. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report, in whole or in part.

During any development programme Brown 2 Green Associates Limited should be consulted if alternative ground conditions are encountered. It assumes during any site works that the contractor will use their best endeavours to manage and control groundwater and other unforeseen ground conditions. Brown 2 Green Associates Limited will not be liable for actions taken prior to consultation.

Where mention has been made to the identification of Japanese Knotweed and other invasive plant species and asbestos or asbestos-containing materials, this is for indicative purposes only and does not constitute or replace full and proper surveys.

APPENDIX II

PROPOSED DEVELOPMENT LAYOUT

Change ID	Item Changed	Last Modified	Modified By

Gross Internal Floor Areas:

Plot 1 = 160m²
Plot 2 = 155m²

N

Scale Bar
0 1 2 3 4 5

Ridge level. 17.78

level. 15.77

Ridge Level 22.43

60

New section of boundary wall

MILL LANE

Plot 1

Plot 2

Kitchen

Living Area

Utility Room

Study

WC

Shower

Bedroom 03

En Suite

Dining Area

Kitchen

Utility Room

Study

WC

Bedroom 03

En Suite

Steel Beam 01

10.000

5.000

Footpath

22

24

1:100

Site Plan - Proposed

Rev	Comment	Issued	Checked	Review

GARY JOHNS ARCHITECTS
44 SILVER STREET, ELY, CAMBRIDGESHIRE, CB7 4JF
TEL : +44(0)1353 665374
E-MAIL : info@johnsarchitectsco.uk
WEB : www.johnsarchitectsco.uk

CLIENT

26 High Street
Burwell
Cambridgeshire CB25 OHB

PROJECT

Proposed housing development
26 High Street
Burwell
Cambridgeshire CB25 OHB

DRAWING TITLE

Site Plan - Proposed

SCALE @ A1	STATUS
1:100	Planning

DRAWN	REVIEWED	DATE
SH	GJ	25.07.2018

DRAWING NUMBER		REVISION
16-417	10	D

APPENDIX III

GEOLOGICAL LOGS

GEOLOGICAL LOG

Project:	26 High Street	**Trial Pit Number:**	SA1
Location:	Burwell		
	Cambridgeshire		
	CB25 0HB	**Date of Excavation:**	13-Jul-23
Project No:	3309	**Type of Machine**	Mini digger
Client	Rowe Build c/o Gary Johns Architects	**Co-ordinates**	N/A
Logged By:	RMI	**Ground Level (m AOD):**	N/A

Sample/Test			Description	Log	Depth (m)	Thick- ness (m)	Ground Water (m)
Sample / Test	Result	Sample range					
			MADE GROUND - Dark grey slightly gravelly, slightly sandy, silty CLAY with rare bricks and carbonaceous materials. Gravel of fine to coarse, angular to subrounded flint, brick and concrete.		0.3	0.3	
			Structureless marly CHALK composed of light cream silty GRAVEL. Gravel of fine to coarse, angular to subrounded very weak marly chalk. (Grade Dc)		1.0		
					1.5	>1.2	
			End of pit.		2.0		
					3.0		
					4.0		
					5.0		
					6.0		
					7.0		

Remarks: Dry.

Dimensions and Orientation: L=1.2m;w=0.4m. NE-SW.

Stability:

Keys J - 250 or 500ml Jar, T - Tub, V - Vial or 60ml jar, D - Small Disturbed, B - Large bulk sample, W - Water sample, HSV - hand shear vane

GEOLOGICAL LOG

Project:	26 High Street	**Trial Pit Number:**	SA2
Location:	Burwell		
	Cambridgeshire		
	CB25 0HB	**Date of Excavation:**	13-Jul-23
Project No:	3309	**Type of Machine**	Mini digger
Client	Rowe Build c/o Gary Johns Architects	**Co-ordinates**	N/A
Logged By:	RMI	**Ground Level (m AOD):**	N/A

Sample/Test			Description	Log	Depth (m)	Thick- ness (m)	Ground Water (m)
Sample / Test	Result	Sample range					
			MADE GROUND - Dark grey slightly gravelly, slightly sandy, silty CLAY with rare bricks and carbonaceous materials. Gravel of fine to coarse, angular to subrounded flint, brick and concrete.		0.3	0.3	
			Structureless marly CHALK composed of light cream silty GRAVEL. Gravel of fine to coarse, angular to subrounded very weak marly chalk. (Grade Dc)		1.0		
					1.45	>1.15	
			End of pit.		2.0		
					3.0		
					4.0		
					5.0		
					6.0		
					7.0		

Remarks: Dry.

Dimensions and Orientation: L=1.2m;w=0.4m. NE-SW.

Stability:

Keys J - 250 or 500ml Jar, T - Tub, V - Vial or 60ml jar, D - Small Disturbed, B - Large bulk sample, W - Water sample, HSV - hand shear vane

GEOLOGICAL LOG

Project:	26 High Street	**Trial Pit Number:**	TP1
Location:	Burwell Cambridgeshire CB25 0HB		
Project No:	3309	**Date of Excavation:**	13-Jul-23
Client	Rowe Build c/o Gary Johns Architects	**Type of Machine**	Mini digger
Logged By:	RMI	**Co-ordinates**	N/A
		Ground Level (m AOD):	N/A

W E

Sample/Test			Description	Log	Depth (m)	Thick- ness (m)	Ground Water (m)
Sample / Test	Result	Sample range					
			MADE GROUND - Dark grey slightly gravelly, slightly sandy, silty CLAY with rare bricks and carbonaceous materials. Gravel of fine to coarse, angular to subrounded flint, brick and concrete.				
			with a wooden beam at 0.5m		0.6		
					1.0		
			Made ground stops at 1.9m.		1.5		
			Structureless marly CHALK composed of light cream silty GRAVEL. Gravel of fine to coarse, angular to subrounded very weak marly chalk. (Grade Dc)		1.9		
			Chalk was also noted along the eastern side of the pit from 0.6m bgl.		2.0		
			End of pit.				
			End of pit.		3.0		
					4.0		
					5.0		
					6.0		
					7.0		

Remarks: Dry.

Dimensions and Orientation: L=1.5m;w=0.5m. NE-SW.

Stability:

Keys J - 250 or 500ml Jar, T - Tub, V - Vial or 60ml jar, D - Small Disturbed, B - Large bulk sample, W - Water sample, HSV - hand shear vane

GEOLOGICAL LOG

Project:	26 High Street	**Trial Pit Number:**	TP2
Location:	Burwell Cambridgeshire CB25 0HB	**Date of Excavation:**	13-Jul-23
Project No:	3309	**Type of Machine**	Mini digger
Client	Rowe Build c/o Gary Johns Architects	**Co-ordinates**	N/A
Logged By:	RMI	**Ground Level (m AOD):**	N/A

Sample/Test			Description		Log	Depth (m)	Thick- ness (m)	Ground Water (m)
Sample / Test	Result	Sample range						
			MADE GROUND - Dark grey slightly gravelly, slightly sandy, silty CLAY with rare bricks and carbonaceous materials. Gravel of fine to coarse, angular to subrounded flint, brick and concrete.			0.6	0.6	
			Structureless marly CHALK composed of light cream silty GRAVEL. Gravel of fine to coarse, angular to subrounded very weak marly chalk. (Grade Dc)			0.9	>0.3	
			End of pit.			1.0		
						2.0		
						3.0		
						4.0		
						5.0		
						6.0		
						7.0		

Remarks: Dry.

Dimensions and Orientation: L=1.5m;w=0.5m. N-S.

Stability:

Keys J - 250 or 500ml Jar, T - Tub, V - Vial or 60ml jar, D - Small Disturbed, B - Large bulk sample, W - Water sample, HSV - hand shear vane

GEOLOGICAL LOG

Project:	26 High Street	**Borehole Number:**	WS1
Location:	Burwell Cambridgeshire CB25 0HB	**Start of Drilling:**	13-Jul-23
Project No:	3309	**Completion of Drilling:**	13-Jul-23
Client	Rowe Build c/o Gary Johns Architects	**Drilling Method:**	Window sampling
Logged By:	RMI	**Ground Level (m AOD):**	N/A

Sample/Test							
Sample / Test	Result	Sample range	Description	Log	Depth (m)	Thick-ness (m)	S/pipe
			MADE GROUND - Dark grey slightly gravelly, slightly sandy, silty CLAY with rare bricks and carbonaceous materials. Gravel of fine to coarse, angular to subrounded flint, brick and concrete.				
T,J,V		0.0-0.3			0.3	0.3	
			Structureless marly CHALK composed of light cream silty GRAVEL.				
D		0.5	Gravel of fine to coarse, angular to subrounded weak marly chalk.				
			(Grade Dc)				
D		1			1.0		
SPT	15,21,25 N>50	1.0-1.1			1.1	>0.8	
			No further advance achieved due to the density of strata. End of borehole.				

2.0

3.0

4.0

5.0

6.0

7.0

Remarks:

Groundwater: Dry on completion.

Keys J - 250 or 500ml Jar, T - Tub, V - Vial or 60ml jar, D - Small Disturbed, B - Large bulk sample, W - Water sample,

GEOLOGICAL LOG

Project:	26 High Street	**Borehole Number:**	WS2
Location:	Burwell		
	Cambridgeshire		
	CB25 0HB	**Start of Drilling:**	13-Jul-23
Project No:	3309	**Completion of Drilling:**	13-Jul-23
Client	Rowe Build c/o Gary Johns Architects	**Drilling Method:**	Window sampling
Logged By:	RMI	**Ground Level (m AOD):**	N/A

Sample/Test							
Sample / Test	Result	Sample range	Description	Log	Depth (m)	Thick-ness (m)	S/pipe
T,J,V		0.0-0.3	MADE GROUND - Dark grey slightly gravelly, slightly sandy, silty CLAY with rare bricks and carbonaceous materials. Gravel of fine to coarse, angular to subrounded flint, brick and concrete.		0.3	0.3	
D		0.5	Structureless marly CHALK composed of light cream silty GRAVEL with occasional brown speckling. Gravel of fine to coarse, angular to subrounded weak marly chalk.				
T,J,V		0.3-0.6	(Grade Dc)				
D		1			1.0		
SPT	1,0,1,0,0 N=1	1.0-1.45					
D		1.5					
D		2			2.0		
SPT	11,14,13,25 N>50	2.0-2.2					
			No further advance achieved due to the density of strata. End of borehole.		2.2	>1.9	

3.0

4.0

5.0

6.0

7.0

Remarks:

Groundwater: Dry on completion.

Keys J - 250 or 500ml Jar, T - Tub, V - Vial or 60ml jar, D - Small Disturbed, B - Large bulk sample, W - Water sample,

GEOLOGICAL LOG

Project:	26 High Street	**Borehole Number:**	WS3
Location:	Burwell Cambridgeshire CB25 0HB	**Start of Drilling:**	13-Jul-23
Project No:	3309	**Completion of Drilling:**	13-Jul-23
Client	Rowe Build c/o Gary Johns Architects	**Drilling Method:**	Window sampling
Logged By:	RMI	**Ground Level (m AOD):**	N/A

Sample/Test			Description	Log	Depth (m)	Thick-ness (m)	S/pipe
Sample / Test	Result	Sample range					
			MADE GROUND - Dark grey slightly gravelly, slightly sandy, silty CLAY with rare bricks and carbonaceous materials. Gravel of fine to coarse, angular to subrounded flint, brick and concrete.		0.3	0.3	
			Structureless marly CHALK composed of light cream silty GRAVEL.				
D		0.5	Gravel of fine to coarse, angular to subrounded weak marly chalk. (Grade Dc)				
D		1			1.0		
SPT	1,1,0,1,0 N=2	1.0-1.45					
D		1.2					
D		2			2.0		
SPT	1,0,0,0,0 N=0	2.0-2.45					
D		3	with very low recovery below 3.0m.		3.0		
SPT	1,1,0,1,0 N=2	3.0-3.45					
					4.0		
SPT	1,0,0,0,0 N=0	4.0-4.45					
D		4.0-5.0			5.0		
SPT	1,0,0,0,0 N=0	5.0-5.45					
					5.45	>5.15	
			End of borehole.				
					6.0		
					7.0		

Remarks:

Groundwater: Dry on completion.

Keys J - 250 or 500ml Jar, T - Tub, V - Vial or 60ml jar, D - Small Disturbed, B - Large bulk sample, W - Water sample,

GEOLOGICAL LOG

Project:	26 High Street	**Borehole Number:**	WS4
Location:	Burwell		
	Cambridgeshire		
	CB25 0HB	**Start of Drilling:**	13-Jul-23
Project No:	3309	**Completion of Drilling:**	13-Jul-23
Client	Rowe Build c/o Gary Johns Architects	**Drilling Method:**	Window sampling
Logged By:	RMI	**Ground Level (m AOD):**	N/A

Sample/Test			Description	Log	Depth (m)	Thick-ness (m)	S/pipe
Sample / Test	Result	Sample range					
			MADE GROUND - Dark grey slightly gravelly, slightly sandy, silty CLAY with rare bricks and charcoal. Gravel of fine to coarse, angular to subrounded flint, brick and concrete.				
T,J,V		0.0-0.6					
T,J,V		0.8-1.0					
SPT	1,0,0,0,0	1.0-1.45			1.0		
	N=0						
					2.0	2.0	
			Structureless marly CHALK composed of light cream silty GRAVEL.				
D		2.2	Gravel of fine to coarse, angular to subrounded weak marly chalk.				
SPT	1,0,1,0,0	2.0-2.45	(Grade Dc)				
	N=1				3.0		
SPT	2,7,8,	3.0-3.4			3.4	>1.4	
	25/5mm		No further advance achieved due to the density of strata. End of borehole.				
	N>50						
					4.0		
					5.0		
					6.0		
					7.0		

Remarks:

Groundwater: Dry on completion.

Keys J - 250 or 500ml Jar, T - Tub, V - Vial or 60ml jar, D - Small Disturbed, B - Large bulk sample, W - Water sample,

GEOLOGICAL LOG

Project:	26 High Street	**Borehole Number:**	WS5
Location:	Burwell		
	Cambridgeshire		
	CB25 0HB	**Start of Drilling:**	13-Jul-23
Project No:	3309	**Completion of Drilling:**	13-Jul-23
Client	Rowe Build c/o Gary Johns Architects	**Drilling Method:**	Window sampling
Logged By:	RMI	**Ground Level (m AOD):**	N/A

Sample/Test							
Sample / Test	Result	Sample range	Description	Log	Depth (m)	Thick-ness (m)	S/pipe
T,J,V		0.0-0.3	MADE GROUND - Dark grey slightly gravelly, slightly sandy, silty CLAY with rare bricks and carbonaceous materials. Gravel of fine to coarse, angular to subrounded flint, brick and concrete.		0.3	0.3	
D		1	Structureless marly CHALK composed of light cream silty GRAVEL. Gravel of fine to coarse, angular to subrounded very weak marly chalk. (Grade Dc)		1.0		
SPT	1,1,0,1,1 N=3	1.0-1.45					
D		1.5					
D		2			2.0		
SPT	2,2,1,3,1 N=7	2.0-2.45					
D		3			3.0		
SPT	3,2,1,2,3 N=8	3.0-3.45					
D		4			4.0		
SPT	2,2,1,3,3 N=9	4.0-4.45					
D		5			5.0		
SPT	3,4,3,2,3 N=12	5.0-5.45					
					5.45	>5.15	
			End of borehole.		6.0		
					7.0		

Remarks:

Groundwater: Dry on completion.

Keys J - 250 or 500ml Jar, T - Tub, V - Vial or 60ml jar, D - Small Disturbed, B - Large bulk sample, W - Water sample,

APPENDIX IV

CHEMICAL ANALYSIS REPORTS

eurofins | Chemtest
Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Amended Report

Report No.:	23-23739-2		
Initial Date of Issue:	19-Jul-2023	**Date of Re-Issue:**	19-Jul-2023
Re-Issue Details:	This report has been revised and directly supersedes 23-23739-1 in its entirety		
Client	Brown 2 Green Associates		
Client Address:	Suite 1, Wenden Court Station Road Wendens Ambo Nr. Saffron Walden Essex CB11 4LB		
Contact(s):	Philip Miles Radu Mihai Ilie		
Project	3309 - 26 High Street, Burwell, Cambridgeshire		
Quotation No.:		**Date Received:**	13-Jul-2023
Order No.:		**Date Instructed:**	13-Jul-2023
No. of Samples:	8		
Turnaround (Wkdays):	5	**Results Due:**	19-Jul-2023
Date Approved:	19-Jul-2023		
Approved By:	[redacted]		
Details:	Stuart Henderson, Technical Manager		

Results - Soil

Project: 3309 - 26 High Street, Burwell, Cambridgeshire

Client: Brown 2 Green Associates		**Chemtest Job No.:**			23-23739	23-23739	23-23739	23-23739	23-23739	23-23739	23-23739	23-23739
Quotation No.:		**Chemtest Sample ID.:**			1673768	1673769	1673770	1673771	1673772	1673773	1673774	1673775
			Sample Location:		WS1	WS2	WS2	WS4	WS4	WS5	WS3	WS5
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		0.00	0.00	0.30	0.00	0.80	0.00	1.20	1.50
			Bottom Depth (m):		0.30	0.30	0.60	0.60	1.00	0.30	1.20	1.50
			Date Sampled:		13-Jul-2023	13-Jul-2023	13-Jul-2023	13-Jul-2023	13-Jul-2023	13-Jul-2023	13-Jul-2023	13-Jul-2023
			Asbestos Lab:		DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM		
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
ACM Type	U	2192		N/A	-	-	-	-	Fibres/Clumps	-		
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	Chrysotile	No Asbestos Detected		
Asbestos by Gravimetry	U	2192	%	0.001					0.004			
Total Asbestos	U	2192	%	0.001					0.004			
Moisture	N	2030	%	0.020	19	21	16	21	20	16	16	21
Soil Colour	N	2040		N/A	Brown	Brown	Brown	Brown	Brown	Brown		
Other Material	N	2040		N/A	Stones	Stones	Stones	Stones	Stones	Stones		
Soil Texture	N	2040		N/A	Sand	Sand	Sand	Sand	Sand	Sand		
pH	M	2010		4.0	8.0		8.2			7.8	8.6	7.9
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	< 0.010		< 0.010			0.014	0.024	0.019
Cyanide (Total)	M	2300	mg/kg	0.50	< 0.50	< 0.50		< 0.50		< 0.50		
Arsenic	M	2455	mg/kg	0.5	2.4	0.5	1.7	7.2	7.5	5.1		
Cadmium	M	2455	mg/kg	0.10	< 0.10	< 0.10	< 0.10	0.25	0.80	0.12		
Chromium	M	2455	mg/kg	0.5	4.0	0.6	4.5	9.3	11	8.0		
Copper	M	2455	mg/kg	0.50	10	2.9	5.1	37	33	19		
Mercury	M	2455	mg/kg	0.05	0.08	< 0.05	< 0.05	0.21	0.17	0.10		
Nickel	M	2455	mg/kg	0.50	6.0	0.88	5.1	13	15	10		
Lead	M	2455	mg/kg	0.50	25	8.4	5.7	120	170	65		
Selenium	M	2455	mg/kg	0.25	0.35	< 0.25	0.33	0.73	0.82	0.56		
Vanadium	U	2455	mg/kg	0.5	6.0	1.1	5.4	13	18	11		
Zinc	M	2455	mg/kg	0.50	38	15	17	120	270	69		
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50		
Aliphatic VPH >C5-C6	U	2780	mg/kg	0.05	< 0.05	< 0.05		< 0.05		< 0.05		
Aliphatic VPH >C6-C7	U	2780	mg/kg	0.05	< 0.05	< 0.05		< 0.05		< 0.05		
Aliphatic VPH >C7-C8	U	2780	mg/kg	0.05	< 0.05	< 0.05		< 0.05		< 0.05		
Aliphatic VPH >C6-C8 (Sum)	N	2780	mg/kg	0.10	< 0.10	< 0.10		< 0.10		< 0.10		
Total Aliphatic VPH >C5-C10	U	2780	mg/kg	0.25	< 0.25	< 0.25		< 0.25		< 0.25		
Aliphatic EPH >C10-C12	M	2690	mg/kg	2.00	7.2	6.1		6.3		4.6		
Aliphatic VPH >C8-C10	U	2780	mg/kg	0.05	< 0.05	< 0.05		< 0.05		< 0.05		
Aliphatic EPH >C12-C16	M	2690	mg/kg	1.00	4.4	3.2		3.1		3.1		
Aliphatic EPH >C16-C21	M	2690	mg/kg	2.00	< 2.0	< 2.0		< 2.0		< 2.0		
Aliphatic EPH >C21-C35	M	2690	mg/kg	3.00	5.3	20		5.1		6.9		
Aliphatic EPH >C35-C40	N	2690	mg/kg	10.00	< 10	< 10		< 10		< 10		
Total Aliphatic EPH >C10-C35	M	2690	mg/kg	5.00	17	30		15		16		
Total Aliphatic EPH >C10-C40	N	2690	mg/kg	10.00	17	30		15		16		
Aromatic VPH >C5-C7	U	2780	mg/kg	0.05	< 0.05	< 0.05		< 0.05		< 0.05		
Aromatic VPH >C7-C8	U	2780	mg/kg	0.05	< 0.05	< 0.05		< 0.05		< 0.05		

Results - Soil

Project: 3309 - 26 High Street, Burwell, Cambridgeshire

Client: Brown 2 Green Associates		**Chemtest Job No.:**			23-23739	23-23739	23-23739	23-23739	23-23739	23-23739	23-23739	23-23739
Quotation No.:		**Chemtest Sample ID.:**			1673768	1673769	1673770	1673771	1673772	1673773	1673774	1673775
		Sample Location:			WS1	WS2	WS2	WS4	WS4	WS5	WS3	WS5
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.00	0.00	0.30	0.00	0.80	0.00	1.20	1.50
		Bottom Depth (m):			0.30	0.30	0.60	0.60	1.00	0.30	1.20	1.50
		Date Sampled:			13-Jul-2023	13-Jul-2023	13-Jul-2023	13-Jul-2023	13-Jul-2023	13-Jul-2023	13-Jul-2023	13-Jul-2023
		Asbestos Lab:			DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM		
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
Aromatic VPH >C8-C10	U	2780	mg/kg	0.05	< 0.05	< 0.05		< 0.05		< 0.05		
Total Aromatic VPH >C5-C10	U	2780	mg/kg	0.25	< 0.25	< 0.25		< 0.25		< 0.25		
Aromatic EPH >C10-C12	U	2690	mg/kg	1.00	< 1.0	< 1.0		< 1.0		< 1.0		
Aromatic EPH >C12-C16	U	2690	mg/kg	1.00	< 1.0	< 1.0		< 1.0		< 1.0		
Aromatic EPH >C16-C21	U	2690	mg/kg	2.00	3.0	3.9		6.6		13		
Aromatic EPH >C21-C35	U	2690	mg/kg	2.00	9.4	9.0		18		40		
Aromatic EPH >C35-C40	N	2690	mg/kg	1.00	4.3	4.2		2.9		7.7		
Total Aromatic EPH >C10-C35	U	2690	mg/kg	5.00	13	13		25		53		
Total Aromatic EPH >C10-C40	N	2690	mg/kg	10.00	17	17		28		61		
Total VPH >C5-C10	U	2780	mg/kg	0.50	< 0.50	< 0.50		< 0.50		< 0.50		
Total EPH >C10-C35	U	2690	mg/kg	10.00	30	43		40		69		
Total EPH >C10-C40	N	2690	mg/kg	10.00	35	47		43		77		
Organic Matter	M	2625	%	0.40	3.0	9.0	6.7	4.8	4.7	5.6		
Dichlorodifluoromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0		< 1.0		
Chloromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0		< 1.0		
Vinyl Chloride	M	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0		< 1.0		
Bromomethane	M	2760	µg/kg	20	< 20	< 20		< 20		< 20		
Chloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0		< 2.0		< 2.0		
Trichlorofluoromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0		< 1.0		
1,1-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0		< 1.0		
Dichloromethane	N	2760	µg/kg	50	< 50	< 50		< 50		< 50		
Trans 1,2-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0		< 1.0		
1,1-Dichloroethane	M	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0		< 1.0		
cis 1,2-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0		< 1.0		
Bromochloromethane	U	2760	µg/kg	5.0	< 5.0	< 5.0		< 5.0		< 5.0		
Trichloromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0		< 1.0		
1,1,1-Trichloroethane	M	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0		< 1.0		
Tetrachloromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0		< 1.0		
1,1-Dichloropropene	U	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0		< 1.0		
Benzene	M	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0		< 1.0		
1,2-Dichloroethane	M	2760	µg/kg	2.0	< 2.0	< 2.0		< 2.0		< 2.0		
Trichloroethene	N	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0		< 1.0		
1,2-Dichloropropane	M	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0		< 1.0		
Dibromomethane	M	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0		< 1.0		
Bromodichloromethane	M	2760	µg/kg	5.0	< 5.0	< 5.0		< 5.0		< 5.0		
cis-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10		< 10		< 10		
Toluene	M	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0		< 1.0		
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10		< 10		< 10		

Results - Soil

Project: 3309 - 26 High Street, Burwell, Cambridgeshire

Client: Brown 2 Green Associates		**Chemtest Job No.:**			23-23739	23-23739	23-23739	23-23739	23-23739	23-23739	23-23739	23-23739
Quotation No.:		**Chemtest Sample ID.:**			1673768	1673769	1673770	1673771	1673772	1673773	1673774	1673775
		Sample Location:			WS1	WS2	WS2	WS4	WS4	WS5	WS3	WS5
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.00	0.00	0.30	0.00	0.80	0.00	1.20	1.50
		Bottom Depth (m):			0.30	0.30	0.60	0.60	1.00	0.30	1.20	1.50
		Date Sampled:			13-Jul-2023	13-Jul-2023	13-Jul-2023	13-Jul-2023	13-Jul-2023	13-Jul-2023	13-Jul-2023	13-Jul-2023
		Asbestos Lab:			DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM		
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
1,1,2-Trichloroethane	M	2760	µg/kg	10	< 10	< 10		< 10		< 10		
Tetrachloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0		< 1.0		
1,3-Dichloropropane	U	2760	µg/kg	2.0	< 2.0	< 2.0		< 2.0		< 2.0		
Dibromochloromethane	U	2760	µg/kg	10	< 10	< 10		< 10		< 10		
1,2-Dibromoethane	M	2760	µg/kg	5.0	< 5.0	< 5.0		< 5.0		< 5.0		
Chlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0		< 1.0		
1,1,1,2-Tetrachloroethane	M	2760	µg/kg	2.0	< 2.0	< 2.0		< 2.0		< 2.0		
Ethylbenzene	M	2760	µg/kg	1.0	< 1.0	1.8		< 1.0		< 1.0		
m & p-Xylene	M	2760	µg/kg	1.0	< 1.0	4.0		< 1.0		< 1.0		
o-Xylene	M	2760	µg/kg	1.0	< 1.0	3.2		< 1.0		< 1.0		
Styrene	M	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0		< 1.0		
Tribromomethane	U	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0		< 1.0		
Isopropylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0		< 1.0		
Bromobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0		< 1.0		
1,2,3-Trichloropropane	N	2760	µg/kg	50	< 50	< 50		< 50		< 50		
N-Propylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0		< 1.0		
2-Chlorotoluene	M	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0		< 1.0		
1,3,5-Trimethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0		< 1.0		
4-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0		< 1.0		
Tert-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0		< 1.0		
1,2,4-Trimethylbenzene	M	2760	µg/kg	1.0	< 1.0	4.2		< 1.0		< 1.0		
Sec-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0		< 1.0		
1,3-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0		< 1.0		
4-Isopropyltoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0		< 1.0		
1,4-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0		< 1.0		
N-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0		< 1.0		
1,2-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0		< 1.0		
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	< 50	< 50		< 50		< 50		
1,2,4-Trichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0		< 1.0		
Hexachlorobutadiene	N	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0		< 1.0		
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	< 2.0	< 2.0		< 2.0		< 2.0		
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0		< 1.0		
Naphthalene	M	2800	mg/kg	0.10	0.47	1.1	< 0.10	0.88	0.72	0.71		
Acenaphthylene	N	2800	mg/kg	0.10	0.14	0.36	< 0.10	0.18	0.41	0.14		
Acenaphthene	M	2800	mg/kg	0.10	0.28	0.49	< 0.10	0.46	0.49	0.31		
Fluorene	M	2800	mg/kg	0.10	0.15	0.21	< 0.10	0.22	0.33	0.18		
Phenanthrene	M	2800	mg/kg	0.10	0.30	0.79	< 0.10	0.57	2.0	0.75		
Anthracene	M	2800	mg/kg	0.10	< 0.10	0.27	< 0.10	0.16	0.51	0.27		

Results - Soil

Project: 3309 - 26 High Street, Burwell, Cambridgeshire

Client: Brown 2 Green Associates			**Chemtest Job No.:**		23-23739	23-23739	23-23739	23-23739	23-23739	23-23739	23-23739	23-23739
Quotation No.:			**Chemtest Sample ID.:**		1673768	1673769	1673770	1673771	1673772	1673773	1673774	1673775
			Sample Location:		WS1	WS2	WS2	WS4	WS4	WS5	WS3	WS5
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		0.00	0.00	0.30	0.00	0.80	0.00	1.20	1.50
			Bottom Depth (m):		0.30	0.30	0.60	0.60	1.00	0.30	1.20	1.50
			Date Sampled:		13-Jul-2023	13-Jul-2023	13-Jul-2023	13-Jul-2023	13-Jul-2023	13-Jul-2023	13-Jul-2023	13-Jul-2023
			Asbestos Lab:		DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM		
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
Fluoranthene	M	2800	mg/kg	0.10	0.56	2.0	< 0.10	1.4	4.6	1.5		
Pyrene	M	2800	mg/kg	0.10	0.55	1.8	< 0.10	1.3	3.9	1.3		
Benzo[a]anthracene	M	2800	mg/kg	0.10	0.26	0.98	< 0.10	0.59	2.0	0.65		
Chrysene	M	2800	mg/kg	0.10	0.27	1.0	< 0.10	0.66	2.2	0.72		
Benzo[b]fluoranthene	M	2800	mg/kg	0.10	0.41	1.5	< 0.10	1.1	3.6	0.92		
Benzo[k]fluoranthene	M	2800	mg/kg	0.10	0.19	0.63	< 0.10	0.45	1.5	0.34		
Benzo[a]pyrene	M	2800	mg/kg	0.10	0.36	1.2	< 0.10	0.79	2.8	0.75		
Indeno(1,2,3-c,d)Pyrene	M	2800	mg/kg	0.10	0.22	1.0	< 0.10	0.68	2.1	0.52		
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10	0.16	< 0.10	0.15	0.56	< 0.10		
Benzo[g,h,i]perylene	M	2800	mg/kg	0.10	0.26	0.95	< 0.10	0.64	2.0	0.55		
Total Of 16 PAH's	N	2800	mg/kg	2.0	4.4	14	< 2.0	10	30	9.6		

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2690	EPH A/A Split	Aliphatics: >C10–C12, >C12–C16, >C16–C21, >C21– C35, >C35– C40 Aromatics: >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35–C40	Acetone/Heptane extraction / GCxGC FID detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2780	VPH A/A Split	Aliphatics: >C5–C6, >C6–C7,>C7–C8,>C8-C10 Aromatics: >C5–C7,>C7-C8,>C8–C10	Water extraction / Headspace GCxGC FID detection
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

APPENDIX V

GAS MONITORING RESULTS

Date: 19th July 2023

Weather Conditions: Overcast	**Temperature (ºC):** 19
Ground Conditions: Dry	**Atmospheric Pressure:** Rising

Monitoring Well – WS3

Time (Mins: Sec)	Methane %v/v	Methane GSV (l/hr)	Carbon Dioxide %v/v	Carbon Dioxide GSV (l/hr)	Oxygen % v/v
0:30	0.0	0.0	1.0	1.0	20.4
1:00	0.0	0.0	1.0	0.001	20.4
1:30	0.0	0.0	1.0	0.001	20.4
2:00	0.0	0.0	1.0	0.001	20.4
3:00	0.0	0.0	1.0	0.001	20.4
4:00	0.0	0.0	1.0	0.001	20.4
5:00	0.0	0.0	1.0	0.001	20.4

H_2S (ppm): 0	CO (ppm): 0	PID (ppm): 0.0
Flow (l/hr): <0.1	Atmospheric Pressure (mbar): 1010	
Depth to Groundwater (mbgl): Dry	Differential Pressure (Pa): 0	

Monitoring Well – WS5

Time (Mins: Sec)	Methane %v/v	Methane GSV (l/hr)	Carbon Dioxide %v/v	Carbon Dioxide GSV (l/hr)	Oxygen % v/v
0:30	0.0	0.0	2.1	0.0021	19.0
1:00	0.0	0.0	2.2	0.0022	18.9
1:30	0.0	0.0	2.2	0.0022	18.9
2:00	0.0	0.0	2.2	0.0022	18.9
3:00	0.0	0.0	2.2	0.0022	18.9
4:00	0.0	0.0	2.2	0.0022	18.9
5:00	0.0	0.0	2.2	0.0022	18.9

H_2S (ppm): 0	CO (ppm): 0	PID (ppm): 0.0
Flow (l/hr): <0.1	Atmospheric Pressure (mbar): 1011	
Depth to Groundwater (mbgl): Dry	Differential Pressure (Pa): 0	

Date: 27th July 2023

Weather Conditions: Cloudy	**Temperature (ºC):** 23
Ground Conditions: damp underfoot	**Atmospheric Pressure:** Static

Monitoring Well – WS3

Time (Mins: Sec)	Methane %v/v	Methane GSV (l/hr)	Carbon Dioxide %v/v	Carbon Dioxide GSV (l/hr)	Oxygen % v/v
0:30	0.0	0.0	0.8	0.0008	20.5
1:00	0.0	0.0	0.8	0.0008	20.5
1:30	0.0	0.0	0.9	0.0009	20.5
2:00	0.0	0.0	0.8	0.0008	20.5
3:00	0.0	0.0	1.0	0.001	20.4
4:00	0.0	0.0	0.9	0.0009	20.4
5:00	0.0	0.0	0.9	0.0009	20.4

H_2S (ppm): 0	CO (ppm): 0	PID (ppm): 0.0
Flow (l/hr): <0.1	Atmospheric Pressure (mbar): 997	
Depth to Groundwater (mbgl): Dry	Differential Pressure (Pa): 0	

Monitoring Well – WS5

Time (Mins: Sec)	Methane %v/v	Methane GSV (l/hr)	Carbon Dioxide %v/v	Carbon Dioxide GSV (l/hr)	Oxygen % v/v
0:30	0.0	0.0	2.2	0.0022	19.0
1:00	0.0	0.0	2.2	0.0022	18.9
1:30	0.0	0.0	2.2	0.0022	18.9
2:00	0.0	0.0	2.2	0.0022	18.9
3:00	0.0	0.0	2.2	0.0022	18.9
4:00	0.0	0.0	2.2	0.0022	18.8
5:00	0.0	0.0	2.2	0.0022	18.8

H_2S (ppm): 0	CO (ppm): 0	PID (ppm): 0.0
Flow (l/hr): <0.1	Atmospheric Pressure (mbar): 997	
Depth to Groundwater (mbgl): Dry	Differential Pressure (Pa): 0	

Date: 3rd August 2023

Weather Conditions: Sunny	**Temperature (ºC):** 20
Ground Conditions: Dry	**Atmospheric Pressure:** Static

Monitoring Well – WS3

Time (Mins: Sec)	Methane %v/v	Methane GSV (l/hr)	Carbon Dioxide %v/v	Carbon Dioxide GSV (l/hr)	Oxygen % v/v
0:30	0.0	0.0	0.8	0.0008	20.6
1:00	0.0	0.0	0.8	0.0008	20.6
1:30	0.0	0.0	0.8	0.0008	20.6
2:00	0.0	0.0	0.8	0.0008	20.6
3:00	0.0	0.0	0.8	0.0008	20.6
4:00	0.0	0.0	0.8	0.0008	20.6
5:00	0.0	0.0	0.8	0.0008	20.6

H_2S (ppm): 0	CO (ppm): 0	PID (ppm): 0.0
Flow (l/hr): <0.1	Atmospheric Pressure (mbar): 1001	
Depth to Ground-water (mbgl): Dry	Differential Pressure (Pa): 0	

Monitoring Well – WS5

Time (Mins: Sec)	Methane %v/v	Methane GSV (l/hr)	Carbon Dioxide %v/v	Carbon Dioxide GSV (l/hr)	Oxygen % v/v
0:30	0.0	0.0	2.1	0.0021	19.3
1:00	0.0	0.0	2.1	0.0021	19.3
1:30	0.0	0.0	2.1	0.0021	19.3
2:00	0.0	0.0	2.1	0.0021	19.2
3:00	0.0	0.0	2.1	0.0021	19.2
4:00	0.0	0.0	2.1	0.0021	19.2
5:00	0.0	0.0	2.1	0.0021	19.2

H_2S (ppm): 0	CO (ppm): 0	PID (ppm): 0.0
Flow (l/hr): <0.1	Atmospheric Pressure (mbar): 1001	
Depth to Groundwater (mbgl): Dry	Differential Pressure (Pa): 0	

Date: 10th August 2023

Weather Conditions: Sunny	**Temperature (ºC):** 25
Ground Conditions: Dry	**Atmospheric Pressure:** Static

Monitoring Well – WS3

Time (Mins: Sec)	Methane %v/v	Methane GSV (l/hr)	Carbon Dioxide %v/v	Carbon Dioxide GSV (l/hr)	Oxygen % v/v
0:30	0.0	0.0	0.7	0.0007	20.7
1:00	0.0	0.0	0.7	0.0007	20.7
1:30	0.0	0.0	0.7	0.0007	20.6
2:00	0.0	0.0	0.7	0.0007	20.6
3:00	0.0	0.0	0.7	0.0007	20.6
4:00	0.0	0.0	0.7	0.0007	20.6
5:00	0.0	0.0	0.7	0.0007	20.6

H_2S (ppm): 0	CO (ppm): 0	PID (ppm): 0.0
Flow (l/hr): <0.1	Atmospheric Pressure (mbar): 1015	
Depth to Groundwater (mbgl): Dry	Differential Pressure (Pa): 0	

Monitoring Well – WS5

Time (Mins: Sec)	Methane %v/v	Methane GSV (l/hr)	Carbon Dioxide %v/v	Carbon Dioxide GSV (l/hr)	Oxygen % v/v
0:30	0.0	0.0	2.1	0.0021	18.6
1:00	0.0	0.0	2.2	0.0022	18.5
1:30	0.0	0.0	2.2	0.0022	18.5
2:00	0.0	0.0	2.2	0.0022	18.4
3:00	0.0	0.0	2.2	0.0022	18.5
4:00	0.0	0.0	2.2	0.0022	18.4
5:00	0.0	0.0	2.2	0.0022	18.4

H_2S (ppm): 0	CO (ppm): 0	PID (ppm): 0.0
Flow (l/hr): <0.1	Atmospheric Pressure (mbar): 1015	
Depth to Groundwater (mbgl): Dry	Differential Pressure (Pa): 0	

Date: 18th August 2023

Weather Conditions: Overcast	**Temperature (ºC):** 19
Ground Conditions: Dry	**Atmospheric Pressure:** Falling

Monitoring Well – WS3

Time (Mins: Sec)	Methane %v/v	Methane GSV (l/hr)	Carbon Dioxide %v/v	Carbon Dioxide GSV (l/hr)	Oxygen % v/v
0:30	0.0	0.0	0.9	0.0009	20.4
1:00	0.0	0.0	1.0	0.001	20.3
1:30	0.0	0.0	1.0	0.001	20.3
2:00	0.0	0.0	1.0	0.001	20.3
3:00	0.0	0.0	1.0	0.001	20.3
4:00	0.0	0.0	1.0	0.001	20.2
5:00	0.0	0.0	1.0	0.001	20.2

H_2S (ppm): 0	CO (ppm): 0	PID (ppm): 0.0
Flow (l/hr): <0.1	Atmospheric Pressure (mbar): 1012	
Depth to Groundwater (mbgl): Dry	Differential Pressure (Pa): 0	

Monitoring Well – WS5

Time (Mins: Sec)	Methane %v/v	Methane GSV (l/hr)	Carbon Dioxide %v/v	Carbon Dioxide GSV (l/hr)	Oxygen % v/v
0:30	0.0	0.0	2.3	0.0023	19.2
1:00	0.0	0.0	2.3	0.0023	19.2
1:30	0.0	0.0	2.3	0.0023	19.2
2:00	0.0	0.0	2.3	0.0023	19.1
3:00	0.0	0.0	2.3	0.0023	19.1
4:00	0.0	0.0	2.3	0.0023	19.1
5:00	0.0	0.0	2.3	0.0023	19.1

H_2S (ppm): 0	CO (ppm): 0	PID (ppm): 0.0
Flow (l/hr): <0.1	Atmospheric Pressure (mbar): 1010	
Depth to Groundwater (mbgl): Dry	Differential Pressure (Pa): 0	

Date: 19th July 2023

Weather Conditions: Overcast	**Temperature (ºC):** 19
Ground Conditions: Dry	**Atmospheric Pressure:** Falling

Monitoring Well – WS3

Time (Mins: Sec)	Methane %v/v	Methane GSV (l/hr)	Carbon Dioxide %v/v	Carbon Dioxide GSV (l/hr)	Oxygen % v/v
0:30	0.0	0.0	0.9	0.0009	20.4
1:00	0.0	0.0	1.0	0.001	20.3
1:30	0.0	0.0	1.0	0.001	20.3
2:00	0.0	0.0	1.0	0.001	20.3
3:00	0.0	0.0	1.0	0.001	20.3
4:00	0.0	0.0	1.0	0.001	20.2
5:00	0.0	0.0	1.0	0.001	20.2

H_2S (ppm): 0	CO (ppm): 0	PID (ppm): 0.0
Flow (l/hr): <0.1	Atmospheric Pressure (mbar): 1012	
Depth to Groundwater (mbgl): Dry	Differential Pressure (Pa): 0	

Monitoring Well – WS5

Time (Mins: Sec)	Methane %v/v	Methane GSV (l/hr)	Carbon Dioxide %v/v	Carbon Dioxide GSV (l/hr)	Oxygen % v/v
0:30	0.0	0.0	2.3	0.0023	19.2
1:00	0.0	0.0	2.3	0.0023	19.2
1:30	0.0	0.0	2.3	0.0023	19.2
2:00	0.0	0.0	2.3	0.0023	19.1
3:00	0.0	0.0	2.3	0.0023	19.1
4:00	0.0	0.0	2.3	0.0023	19.1
5:00	0.0	0.0	2.3	0.0023	19.1

H_2S (ppm): 0	CO (ppm): 0	PID (ppm): 0.0
Flow (l/hr): <0.1	Atmospheric Pressure (mbar): 1010	
Depth to Groundwater (mbgl): Dry	Differential Pressure (Pa): 0	

Date: 24th August 2023

Weather Conditions: Sunny	**Temperature (ºC):** 21
Ground Conditions: Dry	**Atmospheric Pressure:** Static

Monitoring Well – WS3

Time (Mins: Sec)	Methane %v/v	Methane GSV (l/hr)	Carbon Dioxide %v/v	Carbon Dioxide GSV (l/hr)	Oxygen % v/v
0:30	0.0	0.0	1.2	0.0012	20.3
1:00	0.0	0.0	1.2	0.0012	20.2
1:30	0.0	0.0	1.2	0.0012	20.2
2:00	0.0	0.0	1.2	0.0012	20.2
3:00	0.0	0.0	1.2	0.0012	20.2
4:00	0.0	0.0	1.2	0.0012	20.1
5:00	0.0	0.0	1.2	0.0012	20.1

H_2S (ppm): 0	CO (ppm): 0	PID (ppm): 0.0
Flow (l/hr): <0.1	Atmospheric Pressure (mbar): 1008	
Depth to Groundwater (mbgl): Dry	Differential Pressure (Pa): 0	

Monitoring Well – WS5

Time (Mins: Sec)	Methane %v/v	Methane GSV (l/hr)	Carbon Dioxide %v/v	Carbon Dioxide GSV (l/hr)	Oxygen % v/v
0:30	0.0	0.0	2.5	0.0025	18.8
1:00	0.0	0.0	2.5	0.0025	18.8
1:30	0.0	0.0	2.5	0.0025	18.7
2:00	0.0	0.0	2.5	0.0025	18.7
3:00	0.0	0.0	2.5	0.0025	18.7
4:00	0.0	0.0	2.5	0.0025	18.7
5:00	0.0	0.0	2.5	0.0025	18.7

H_2S (ppm): 0	CO (ppm): 0	PID (ppm): 0.0
Flow (l/hr): <0.1	Atmospheric Pressure (mbar): 1008	
Depth to Groundwater (mbgl): Dry	Differential Pressure (Pa): 0	

APPENDIX VI

ASBESTOS RISK ASSESSMENT

JIWG

Joint Industry Working Group

Asbestos in Soil and Construction & Demolition Materials

Decision Support Tool for Receptor Risk Ranking

Stage 1

Hazard Identification		Score
Select ACM type (run model for each type to generate 'Worst Case' output)	Free dispersed fibres/fibre bundles	2
Extent of degradation of ACMs	Disaggregated (dominated by loose fibrous material; extreme degradation in ACM and/or free asbestos fibres/fibre bundles)	4
Friability and degree of bonding by matrix (ACM matrix, not ground materials)	Friable ACM or ACM with fibres not linked in any matrix (free dispersed fibres/fibre bundles)	4
Distribution of Visible Asbestos Across Affected Area	No visible ACMs/fibre bundles	0
Asbestos fibre type	Chrysotile alone	0
Sub-total		10
Hazard ranking		Low

Stage 2

Emission Factors		Score
Amount of asbestos fibre in selected ACM/fibre type as % of host material	Very Low quantities - 0.001 to 0.01 %wt/wt	1
Respirable fibre index for ACM - RIVM report 711701034 (2003)	Negligible	0
Activity type and effect on deterioration of ACMs	No disturbance activity	0
Best description of primary host material matrix	Fine Silt and/or Clay	1
Sub-total		2
Exposure ranking		Very Low

Stage 3

Pathway and Receptor Sensitivity		Score	
Receptor category	Residential	No score required	
Age of Receptor	Infant (under 5)	4	
Duration of exposure/site occupancy	<1 hour in any week (e.g. short duration work or equivalent infrequent exposure event when exposure aggregated over 1 yr)	0	
Receptor ranking		4	Low
Combined hazard, exposure and receptor ranking			Low
Pathway: Distance of Receptor from Source	In or within 10m of area of disturbance	4	
Pathway: Depth to impacted material	Material buried at depth, unlikely to be disturbed except for deeper construction related excavation	B	
Pathway ranking		4B	Very Low
Overall ranking			Negligible

Project Reference	3 3 0 9
Site Name	26 High Street, Burwell
Client	Rowe Build c/o Gary Johns Architects
Run by	RMI
Date	08-Sep-23
Reviewed by	
Characterisation of scenario being evaluated	Loose chrysotile fibres buried at depth within the footprint of a proposed building.
Interpretation of scenario ranking by DST	The risk is considered to be negligible as no exposure pathways will be active.

JIWG

Joint Industry Working Group

Asbestos in Soil and Construction & Demolition Materials

Project Reference	3309
Site Name	26 High Street, Burwell
Client	Rowe Build c/o Gary Johns Architects
Run by	RMI
Date	08-Sep-23
Scenario details	Loose chrysotile fibres buried at depth.

Decision Support Tool for CAR2012 Work Categories

Stage 1

Hazard Factors

		Score
Select ACM type (run model for each type to generate 'Worst Case' output)	Free dispersed fibres/fibre bundles	2
Extent of degradation of ACMs at outset of work	Disaggregated (dominated by loose fibrous material; extreme degradation in ACM and/or free asbestos fibres/fibre bundles)	4
Friability and degree of bonding by matrix (ACM matrix, not ground materials)	Friable ACM or ACM with fibres not linked in any matrix (free dispersed fibres/fibre bundles)	4
Distribution of Visible Asbestos Across Affected Area	No visible ACMs/fibre bundles	0
Amount of asbestos fibre in selected ACM/fibre type as % of host material	Very Low quantities - <0.001 to 0.01 %wt/wt	1
Sub-total		11

Note: the asbestos licensing regime is unaffected by the type of asbestos fibre present in ACMs

Hazard ranking: Medium

Stage 2

Exposure Factors

		Score
Anticipated airborne fibre concentration - Control Limit or SALI?	<0.01 fibres/ml	1
Anticipated duration of exposure to asbestos	> 2 hours in a 7 day period and Up to 10 hours in a day (e.g. full time occupational exposure)	4
Activity type and effect on deterioration of ACMs during work	Sampling, manual or mechanical (no or minimal deterioration expected)	0
Best description of primary host material matrix (soil/made ground)	Fine Silt and/or Clay	1
Respirable fibre index for ACM - RIVM report 711701034 (2003)	Medium	3
Sub-total		9
Exposure ranking		Low
Combined hazard and exposure ranking	20	Low

Stage 3

Risk Assessment Outputs

Probable Licensing Status	Non-Licensed Work
RPE*	EN149 type FFP3 disposable
Dust Suppression**	Manual/localised dust suppression
Hygiene/Decontamination***	Localised and basic personal decontamination facilities

*Where RPE has to be worn continuously for long periods (e.g. more than 1-hour), then powered RPE may be necessary.
**Reduction in control measures possible if natural mitigation factors are present (e.g. raining, wet ground)
***Guide only; suitability of selected personal hygiene measures may be reviewed on a site/contamination-specific basis